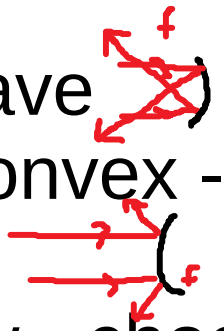
Test Ch 17 and 18 May 24th, Thursday

Solve mirrors and lenses problems using:

1. scale ray diagram
2. equations
   magnification m = hi/ho = -di/do
   1/do + 1/di = 1/f

   rules/steps for scale ray diagrams

1. draw a principle axis - line perpendicular to the centre of curvature of the mirror/lens.
2. draw a mirror or lens - concave (curves in - like a cave) or convex - (fat in middle)



3. Draw an object - as an arrow - choose your scale to measure the size and location. If the size of the object is not specified, you can pick any size.
4. Specify the focal point, f = 1/2 c where c is the radius of curvature

Rays from distant object focus at f.

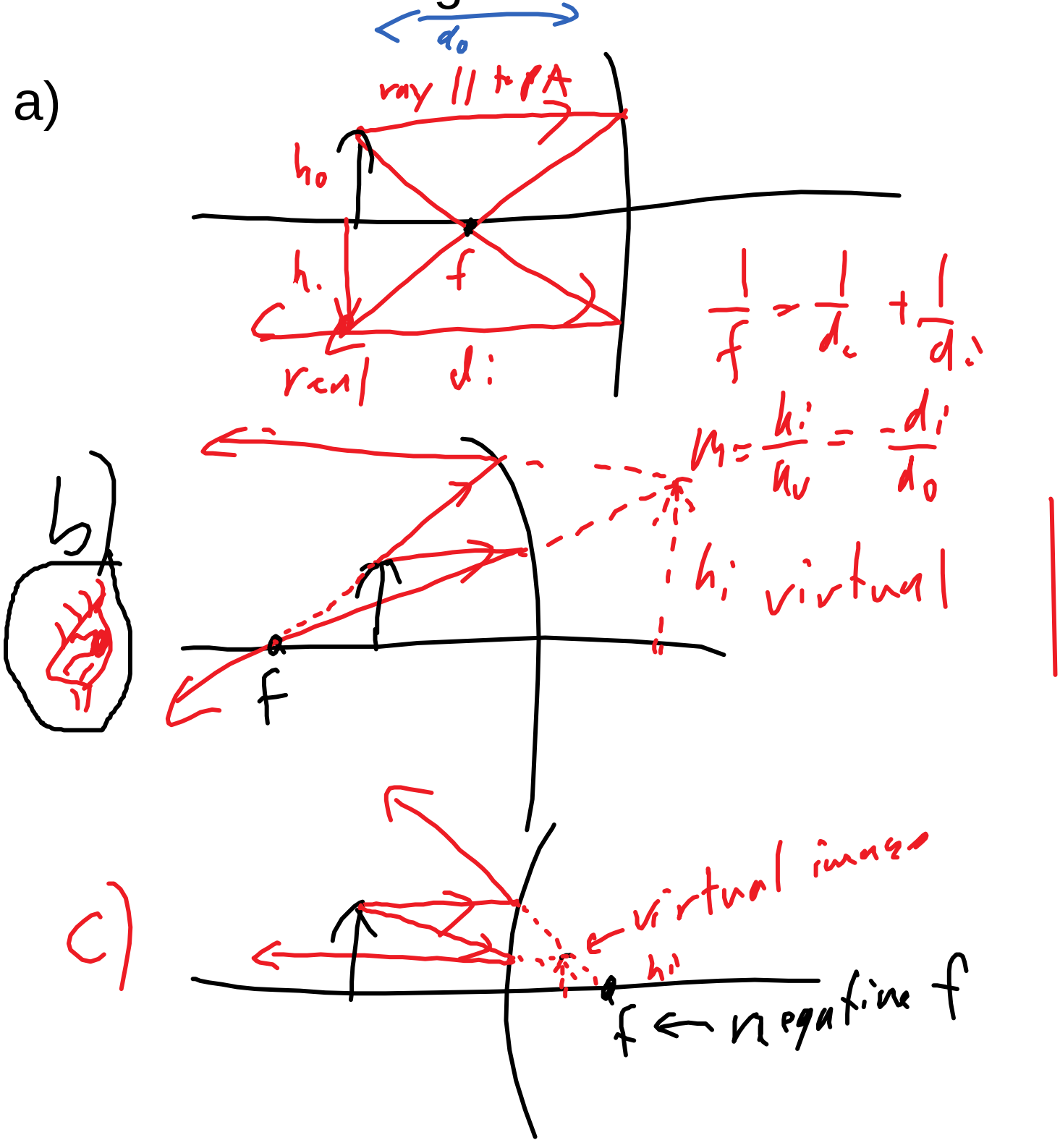
5. draw rays from the top of the object
   one ray parallel to the principle axis that reflects to/from the focal point
   the second to/from the focal point that reflects parallel to the principle axis.
6. If the rays meet, that is the location of the real image. If they don't meet, trace them back to where they come from and locate a virtual image.
7. Measure the size and location of the image. Compare to the results of the equation.

trick for the equation: diverging devices (convex mirror or concave lens) the focal length is negative.

eg. A 12.0 cm pen is in front of a mirror. Determine the size and location of the image if

a) the pen is 45.0 cm from a concave mirror focal length 30.0 cm
b) the pen is 10.0 cm from a concave mirror focal length 30.0 cm

c) the pen is 45.0 cm from a convex mirror focal length 30.0 cm



a) 1/f = 1/do + 1/di

1/30cm = 1/45cm + 1/di

3/90 - 2/90 = 1/90 = 1/di

di = 90cm

m = hi/ho = -di/do

hi = hox(-di)/do = 12x(-90)/45=-24 cm

m= hi/ho = -2X the magnification

b) 1/f = 1/do + 1/di

1/30cm = 1/10cm + 1/di

1/30 - 3/30 = -2/30 = 1/di

di = -15cm (behind the mirror)

m = hi/ho = -di/do

hi = hox(-di)/do = 12x(15)/10=18 cm

m= hi/ho 18/12

=1.5X the magnification

c) 1/f = 1/do + 1/di f is neg.

1/-30cm = 1/45cm + 1/di

-3/90 - 2/90 = -5/90 = 1/di

di = -18cm

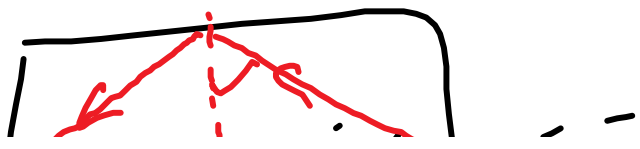
m = hi/ho = -di/do

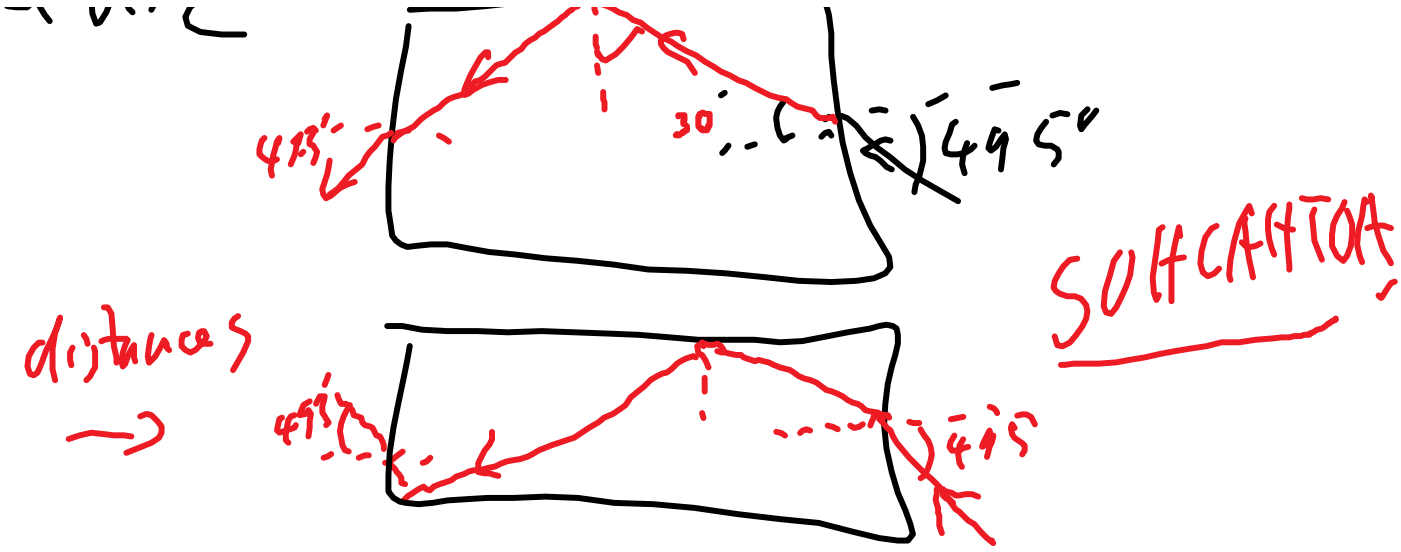
hi = hox(-di)/do = 12x(18)/45=4.8 cm

m= hi/ho = 4.8/12=0.4

0.4 X the magnification

Quiz





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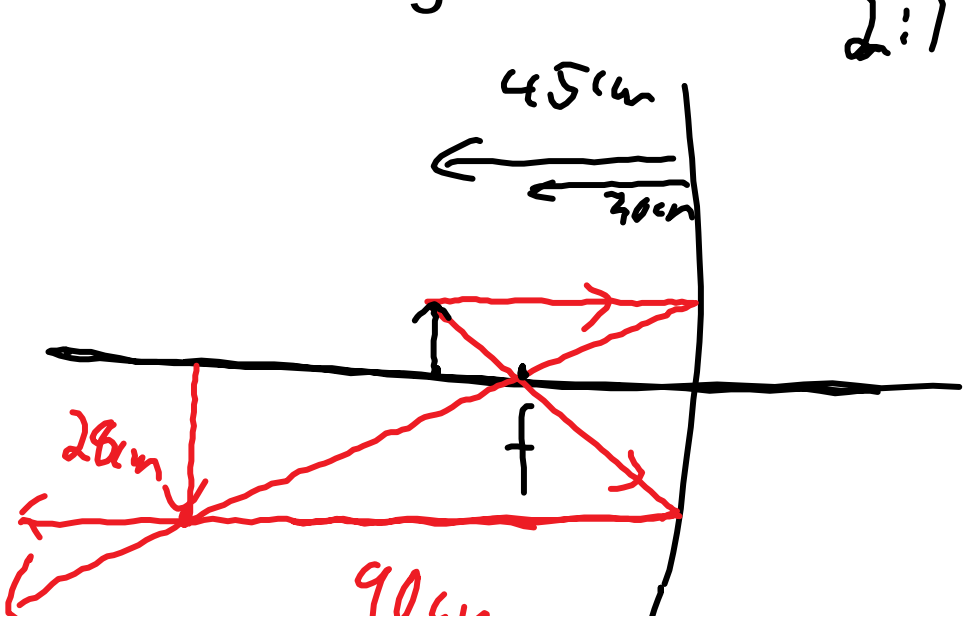

90cm

$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$

$\frac{1}{30} = \frac{1}{45} + \frac{1}{d_i}$

$\frac{3}{90} - \frac{2}{90} = \frac{1}{90} = \frac{1}{d_i}$

$d_i = 90\,cm$

$m = \frac{h_i}{h_o} = -\frac{d_i}{d_o}$

$h_i = 12\,cm \times \frac{(-90\,cm)}{45\,cm}$

$m = 2\times$

$h_i = -24\,cm$